



Third Five-Year Review Report

for

General Mills/Henkel Corporation

City of Minneapolis

Hennepin County, Minnesota

September 2004

PREPARED BY:

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Minnesota Pollution Control Agency

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Sept. 13, 2004

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Richard C. Karl
Acting Director, Region 5 Superfund Division
United States Environmental Protection Agency

Date:

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List of Acronyms

ACLs	Alternate Concentration Levels
AMR	Annual Monitoring Report
AOC	Administrative Order of Consent
ARARs	Applicable or Relevant and Appropriate Requirements
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CERCLIS	Comprehensive Environmental Response, Compensation, and Liability Information System
CFR	Code of Federal Regulations
COC	Chemical of Concern
EPA	United States Environmental Protection Agency
HBV	Health Based Value
HRL	Health Risk Level
IC	Institutional Control
IPE	Isopropyl Ether
MCES	Metropolitan Council Environmental Services
MCLs	Maximum Contaminant Levels
MDH	Minnesota Department of Health
MERLA	Minnesota Environmental Liability and Response Act
MPCA	Minnesota Pollution Control Agency
NCP	Nation Oil and Hazardous Substances Pollution Contingency Plan
NPDES	National Pollutant Discharge Elimination System
NPL	National Priorities List
O&M	Operation and Maintenance
OSHA	Occupational Safety and Health Administration
OU	Operable Unit
PLP	Permanent List of Priorities
POTW	Publicly Owned Treatment Works
PRP	Potentially Responsible Party
RA	Remedial Action
RAGS	Risk Assessment Guidance for Superfund
RAL	Recommended Allowable Limit
RAO	Remedial Action Objective
RCRA	Resource Conservation and Recovery Act
ROD	Record of Decision
SARA	Superfund Amendments and Reauthorization Act of 1986
SDWA	Safe Drinking Water Act
TBCs	To Be Considereds
VOCs	Volatile Organic Compounds
WasteLan	The Regional database related to CERCLIS

Executive Summary

The remedy for the General Mills/Henkel Corporation Site located in Minneapolis, Minnesota included the construction and operation of a groundwater containment system and establishment of a long-term groundwater monitoring network. The trigger for this five-year review was the EPA approval date for the previous five-year review.

General Mills initiated the subsurface investigation in 1981. The contaminated soil and the absorption pit were reportedly excavated in the early 1980's. Multiple monitoring wells and containment wells were installed between 1982 and 1985. The groundwater containment system was placed into operation during November and December 1985 and continues to the present. The groundwater containment remedy is removing VOCs from the glacial drift aquifer and from the Carimona/Magnolia Members of the Platteville Formation and is controlling plume migration both laterally and vertically. The remedy is functioning as intended and is protective of human health and the environment.

Five-Year Review Summary Form

SITE IDENTIFICATION		
Site name <i>(from WasteLAN)</i> : General Mills/Henkel Corporation		
EPA ID <i>(from WasteLAN)</i> : MND051441731		
Region: 5	State: MN	City/County: City of Minneapolis/Hennepin County
SITE STATUS		
NPL status: Final		
Remediation status <i>(choose all that apply)</i> : Operating		
Multiple OUs? No	Construction completion date: June 5, 1992	
Has site been put into reuse? Yes		
REVIEW STATUS		
Lead agency: State - MPCA		
Author name: Mark Rys		
Author title: Project Manager	Author affiliation: MN Pollution Control Agency	
Review period:** 3 / 22 / 2004 to 9 / 20 / 2004		
Date(s) of site inspection: 6 / 3 / 2004		
Type of review: Pre-Sara		
Review number: Third (3)		
Triggering action: Previous Five-Year Review Report		
Triggering action date <i>(from WasteLAN)</i> : September 23, 1999		
Due date <i>(five years after triggering action date)</i> : September 23, 2004		

* ["OU" refers to operable unit.]

** [Review period should correspond to the actual start and end dates of the Five-Year Review in WasteLAN.]

Five-Year Review Summary Form, cont'd.

Issues:

The institutional controls are not in place. The current land owner, BBD Holdings, has submitted a draft restrictive covenant to the MPCA for review. The institutional controls will be recorded with Hennepin County once they are approved by the MPCA.

The standards in the Consent Order are no longer appropriate performance criteria to evaluate Site closure.

Recommendations and Follow-up Actions:

The groundwater remedy is containing the VOC plume within the glacial drift aquifer and the Carimona and Magnolia Members of the Platteville Formation. It is recommended that the groundwater remedy continue. It is also recommended that the Consent Order be revised to establish new performance standards for Site closure and to clarify the objective of the remedy as plume containment.

Protectiveness Statement(s):

The groundwater containment remedy is controlling plume migration both laterally and vertically. The remedy is functioning as intended and is protective of human health and the environment in the short term. Long term protectiveness will be ensured once the amended performance standards are implemented and the institutional controls are in place.

Other Comments:

None

FIVE-YEAR REVIEW REPORT

**General Mills/Henkel Corporation
Minneapolis, Minnesota**

I. INTRODUCTION

The purpose of the five-year review is to determine whether the remedy at the General Mills/Henkel Corporation Site is protective of human health and the environment. The methods, findings and conclusions of reviews are documented in Five-Year Review reports. In addition, Five-Year Review reports identify issues during the review, if any, and identify recommendations to address them.

The Agency is preparing this Five-Year Review report pursuant to CERLA Section 121 and the National Contingency Plan (NCP). CERLA Section 121 states:

If the President selects a remedial action that results in any hazardous substances, pollutants, or contaminants remaining at the site, the President shall review such remedial action no less often than each five years after the initiation of such remedial action to ensure that human health and the environment are being protected by the remedial action being implemented. In addition, if upon such review it is the judgement of the President that action is appropriate at such site in accordance with section [104] or [106], the President shall take or require such action. The President shall report to the Congress a list of facilities for which such review is required, the results of all such reviews, and any actions taken as a result of such actions.

The Agency interpreted this requirement further in the NCP; 40 CFR Section 300.430(f)(4)(ii) states:

If a remedial action is selected that results in hazardous substances, pollutants, or contaminants remaining at the site above levels that allow for unlimited use and unrestricted exposure, the lead agency shall review such action no less often than every five years after initiation of the selected remedial action.

The Minnesota Pollution Control Agency (MPCA) staff has completed a Five-Year Review of the Remedial Actions (RAs) conducted at the General Mills/Henkel Corporation Site in Minneapolis, Minnesota by General Mills. This Five-Year Review evaluates whether the RA remains protective of public health, welfare, and the environment and was conducted from March 2004 through September 2004.

This review focuses on the protectiveness of the General Mills/Henkel Corporation Site RA nineteen years from the time the RA commenced. The first Five-Year Review was completed by EPA on September 30, 1994 and the second was completed by MPCA.

EPA concurred on the second Five-Year Review in a letter received by MPCA on September 23, 1999.

II. SITE CHRONOLOGY

Chronology of Site Events

Date	Event
1981	Investigation performed by General Mills.
1982 – 1984	General Mills installed a total of 27 monitoring wells.
1983	General Mills evaluated the remedial alternatives.
9/21/1984	Site was listed on National Priorities List (NPL)
10/23/1984	Finalized a Response Order by Consent (Consent Order) between General Mills and MPCA which established the RA for the Site.
1985	Six groundwater containment wells were installed.
Nov/Dec 1985	Containment wells began operation.
8/1992	Two additional containment wells were installed.
9/30/1994	Completion of the first Five-Year Review by EPA.
9/23/1999	Receipt of the EPA approval letter for the second Five-Year Review which was completed by the MPCA on September 9, 1999.
May 2001	General Mills completed additional soil assessment at the former absorption pit.
1985 - Present	Ongoing operation, maintenance and monitoring of the groundwater remedy.

III. BACKGROUND

Physical Characteristics

The General Mills/Henkel Corporation Site is located at 2010 East Hennepin Avenue in Minneapolis, Minnesota (Figure 1). The property comprised 10 acres and was used by General Mills as a technical research facility for food and chemical research from 1930 to 1977. The Henkel Corporation purchased the property from General Mills on August 31, 1977. BBD Holding purchased the property from the Henkel Corporation in September 1989.

Adjacent Land and Resource Use

Adjacent land use consists of light industrial with some residential and commercial properties.

History of Contamination

General Mills operated a technical research facility from about 1930 through 1977. Food research was the primary activity through 1947, when General Mills began chemical research in addition to food research. From 1947 through 1962, a soil absorption pit was used to dispose of laboratory solvents. The absorption pit consisted of a series of three stacked, perforated 55-gallon drums buried to a depth of 10 to 12 feet. General Mills estimated that up to 1,000 gallons of solvents were discharged to the pit annually from 1947 to 1962.

On August 31, 1977, the Henkel Corporation purchased the property from General Mills. The drums and piping associated with the absorption pit were reportedly excavated in 1981.

Initial Response

Site Investigation

In June 1981, General Mills notified the MPCA that they intended to investigate the soil absorption pit. Eleven soil borings were advanced and soil samples from three of the borings contained elevated concentrations of volatile organic compounds (VOCs). Laboratory analysis detected benzene, toluene, xylene, methyl isobutyl ketone, ethyl benzene, methylene chloride, 1,1,1-trichloroethane, 1,1,2,2-tetrachloroethane, 1,1,2-trichloroethane, 1,1,2,2-tetrachloroethylene, chlorobenzene and trichloroethylene (TCE). In 1983, three additional borings were advanced in the areas exhibiting elevated VOC concentrations in 1981. One of the additional borings contained elevated VOC concentrations.

Sixteen groundwater monitoring wells were installed in 1982, seven wells were installed in 1983 and four in 1984. Laboratory analysis detected multiple VOCs in the samples from the monitoring wells; however, TCE has been the primary contaminant. Groundwater monitoring detected TCE in the glacial aquifer, the Platteville Formation (Carimona and Magnolia Members), the St. Peter Sandstone and the Prairie du Chien Group. The highest concentrations were detected in the glacial aquifer and the Platteville Formation.

Remedial Actions

The drums and piping associated with the absorption pit were reportedly excavated in 1981. The base of the excavation was reportedly 12 feet deep.

Based on the findings of the initial soil and groundwater assessment, General Mills analyzed different remedial alternatives in 1983 to address the Site contamination. The alternatives were presented in a document "Summary of Alternative Remedial Actions" and are listed below:

- 1). No Action.
- 2). Excavation of contaminated soils in the vadose zone.
- 3). A 45-foot diameter excavation of contaminated soils to a depth of 30 feet (vadose and saturated zone).
- 4). A 70-foot diameter excavation of contaminated soils to a depth of 30 feet.
- 5). Venting of the vadose zone in conjunction with a groundwater pumpout system.
- 6). Groundwater pumpout system.
- 7). Slurry wall and cap.
- 8). Soil washing in conjunction with a groundwater pumpout system.

The groundwater pumpout system was chosen since the other options would not eliminate the need for, or significantly reduce the operating time for, a groundwater pumpout system. The decision to use a groundwater pumpout system was finalized on October 23, 1984 through a Consent Order between General Mills and the MPCA.

In 1985, a total of six groundwater containment wells were installed by General Mills to remediate groundwater. Three of the six containment wells were installed downgradient of the Site in the glacial drift aquifer and the three remaining wells were installed on the General Mills property. Of the three wells installed on the General Mills property, two were installed in the glacial drift aquifer (109 and 110) and one was installed in the Carimona Member aquifer (108) of the Platteville Formation (Figure 2).

Groundwater extraction from the three containment wells installed on the General Mills property began on November 1, 1985. The groundwater from the three containment wells was pumped to an onsite air stripper for treatment prior to discharge to the Minneapolis storm sewer system. The treated groundwater eventually discharges to the Mississippi River and is regulated by a National Pollution Discharge Elimination System (NPDES) permit.

Groundwater extraction from the three downgradient containment wells began on December 5, 1985. The groundwater is discharged to the storm sewer system for eventual discharge to the Mississippi River. The discharge is regulated by an NPDES permit.

In August 1992, two additional groundwater containment wells (MG1 and MG2) were installed on the Site to remediate the Magnolia Member aquifer of the Platteville Formation. Pursuant to the Consent Order, additional groundwater extraction is required if monitoring wells in the Magnolia Member aquifer contain TCE concentrations greater than 27 micrograms per liter (ug/l). The groundwater pumped from the Magnolia Member aquifer is pumped directly to the storm sewer. The discharge is regulated by an NPDES permit.

Site Monitoring

As specified in the RAP, groundwater monitoring is performed to 1) monitor the effectiveness of the groundwater pumpout system; 2) define changes in the distribution of VOCs; and 3) determine when operation of the pumpout system can be modified or terminated. The monitoring well network consists of the containment wells, select monitoring wells and one former private well.

Basis For Taking Action

Hazardous substances were present in drums and containers and hazardous substances were detected in soil and groundwater. The hazardous substances include:

Soil

Benzene
Toluene
Ethyl benzene
Xylene
Methyl isobutyl ketone
Methylene chloride
1,1,1-trichloroethane
1,1,2,2-tetrachloroethane
1,1,2-trichloroethane
1,1,2,2-tetrachloroethylene
Chlorobenzene
Trichloroethylene (TCE)

Groundwater

Benzene
Toluene
Ethyl benzene
Xylenes
Methyl isobutyl ketone
Methylene chloride
1,1,1-trichloroethane
1,1,2,2-tetrachloroethane
1,1,2-trichloroethane
1,1,2,2-tetrachloroethylene
Chlorobenzene
TCE

IV. REMEDIAL ACTIONS

Remedy Selection

The Consent Order, signed October 23, 1984, stated that "This Order shall govern the implementation of a Remedial Action Plan and also the development and implementation of an investigation of the St. Peter Formation to be undertaken with regard to the General Mills site." The RAP further states "The purpose of this Remedial Action Plan.... is to define and implement the procedures necessary for minimizing the further migration of volatile organic hydrocarbons and in particular trichloroethylene (TCE) detected near the General Mills absorption pit in the ground water in the glacial drift and the Platteville Formation, and to improve the quality of the ground water in the glacial drift and Platteville Formation in the area of the General Mills absorption pit."

The selected remedy consists of groundwater pumping for the purpose of plume control in order to prevent further migration of contaminants in the aquifers. Long term monitoring is being implemented to verify the effectiveness of the containment system.

Remedy Implementation

The October 23, 1984 Consent Order documented the RA for the General Mills/Henkel Corporation Site to include the construction and operation of a groundwater pump and containment system with long-term groundwater monitoring.

The remedy initially consisted of the implementation of a groundwater containment system in the glacial drift aquifer and in the Carimona Member of the Platteville Formation. The containment system was subsequently modified to include implementation of groundwater containment in the Magnolia Member of the Platteville Formation and discontinuation of groundwater pumping from the containment well in the Carimona Member.

There currently are seven containment wells, with five of the wells pumping from the glacial aquifer and two wells pumping from the Magnolia aquifer. Groundwater from the onsite glacial drift wells is pumped to an air stripper for treatment prior to discharge to the storm sewer. The groundwater from the remaining containment wells is pumped directly to the storm sewer. The storm sewer eventually discharges the water to the Mississippi River. The discharge to the storm sewer is regulated by an NPDES permit.

System Operations and Maintenance

General Mills is performing ongoing operation, maintenance and monitoring for the groundwater containment system. The primary activities include the following:

- Periodic operational and equipment inspections and maintenance;
- Monthly volumetric flow measurements at each containment well;
- Quarterly sampling of the discharge from the containment wells to the storm sewer per the requirements of the NPDES discharge permit;
- Sampling and analysis of water samples collected from the containment wells pursuant to the 2000-2005 Operations and Monitoring Plan;
- Annual water level measurements at select monitoring wells;
- Annual sampling and analysis of groundwater samples from select monitoring wells pursuant to the 2000-2005 Operations and Monitoring Plan.
- Routine maintenance at the containment wells and the air stripper as required by site specific conditions; and
- Submittal of an annual groundwater monitoring report to the MPCA.

The operation and maintenance costs obtained from General Mills indicated that \$100,000 is spent annually to maintain the remedy.

V. PROGRESS SINCE THE LAST REVIEW

The last Five-Year Review, completed in 1999, contained several recommendations that are summarized as follows:

- The cleanup level for TCE established in the Consent Order ... shall be met before the Consent Order is terminated.
- A determination regarding the protectiveness of the remedy will be made once the cleanup level for TCE has been achieved, using the standards and requirements in effect at the time, and prior to termination of the Consent Order.
- If it is determined that the remedy is not protective, action shall be taken by the MPCA or U.S. EPA to ensure that the 5 ppb standard for TCE or whatever the current standard is (the lowest of MCL, HRL or standard in effect at that time) is achieved.
- The St. Peter Sandstone which is not part of the Consent Order between General Mills and MPCA appears to have contamination at levels greater than 5 ppb TCE. Routine monitoring should continue in the St. Peter to demonstrate the effectiveness of the remedial action in preventing migration of TCE throughout the aquifer system in the area.
- Groundwater is monitored annually in the monitoring wells associated with this site. The analyte list should continue to alternate from year to year, with TCE being monitored one year and a suite of VOCs, including vinyl chloride, monitored in the alternate year.
- No work has been done to date to address soil contamination associated with the Site. Unless source area soils are disturbed during future utility or development activities, risk of exposure to surface receptors appears unlikely at this time due to the depth of contaminated soil. However, this issue will need to be addressed prior to closing out the Site.

The first three recommendations do not require immediate attention other than ongoing operation of the groundwater containment system and longterm monitoring, which is occurring.

A groundwater sample is collected from the St. Peter Sandstone on an annual basis for laboratory analysis as required by Recommendation 4.

Groundwater monitoring is performed pursuant to the 2000-2005 Groundwater Monitoring Plan which was approved by the MPCA (Recommendation 5).

General Mills performed additional soil assessment in the vicinity of the former absorption pit in 2001 to address Recommendation 6. The results of the assessment indicated that contamination was present above risk criteria at depths exceeding four feet below grade. The lack of soil contamination in near surface soils, 0-4 feet below grade, indicated that soil contamination remaining in place will not pose a surface exposure risk. The contamination remaining at depth will be managed through institutional controls in the form of a restrictive covenant which shall be posted on the property deed and

recorded with Hennepin County. The MPCA stated in a September 28, 2001 letter, with the implementation of the institutional control noted above, no further action will be required to address contaminated soils at the Site.

VI. FIVE-YEAR REVIEW PROCESS

Administrative Components

The Five-Year Review was initiated on March 22, 2004. The General Mills representative was notified of the initiation of the Five-Year Review during April 2004. The review components included:

- Community Involvement;
- Document Review;
- Data Review;
- Site Inspection;
- Local Interviews: and
- Five-Year Review Report Development and Review.

Community Involvement

On May 2, 2004, a notice was published in the Star Tribune, announcing that a Five-Year Review was being conducted for the General Mills/Henkel Site located in Minneapolis, Minnesota.

A representative of General Mills was notified by a telephone interview that a five-year review was being performed.

Document Review

This Five-Year Review included a review of relevant documents including the Consent Order, the annual monitoring reports (AMRs), MPCA staff response letters and the previous Five-Year Review reports. A list of the reviewed documents is presented in the Bibliography (Appendix C).

ARAR Review

The Five-Year Review is being conducted to determine whether the General Mills/Henkel Corporation Site RA remains protective of public health and the environment. Five-Year Review guidance established policy for EPA to review and analyze the RA at a site as it is affected by newly promulgated or modified federal and state environmental laws. ARARs associated with the construction and long-term maintenance and monitoring of the RA at the General Mills/Henkel Corporation Site were not addressed in the Consent

Order. However, the RA must meet the applicable or relevant and appropriate federal and state requirements.

ARARs for the selected remedy are listed below.

Minnesota Rules Chapter 4725. Water Well Code.

Establishes standards for the construction, maintenance and sealing of wells.

This ARAR continues to apply even though the wells were previously constructed, because it governs the maintenance and sealing of wells.

Clean Water Act, 40 CFR. Regulates Discharge to Surface Waters.

This ARAR applies because contaminated groundwater is pumped into the storm sewer system and eventually discharges to the Mississippi River per the requirements of a National Pollutant Discharge Elimination System (NPDES) permit issued by the MPCA.

The NPDES permit, Permit Number 0056022, was renewed on May 15, 2000. The current NPDES permit requires quarterly sampling and established discharge limits, which include an annual average effluent TCE concentration of 50 microgram per liter (ug/l) with a daily maximum of 100 ug/l.

Minnesota Rules Chapter 7060

Establishes uses and the nondegradation goal for uncontaminated groundwater and provides direction on when and how contaminated groundwater must be managed.

Minnesota Rules Part 4717.7100 to 4717.7800. Establishes Health Risk Limits (HRL).

A HRL is a concentration of groundwater contaminant or mixture of groundwater contaminants that can safely be consumed daily for a lifetime. A HRL is expressed as a concentration in parts per billion or calculated as a "hazard index. HRLs were not in existence at the time of the Consent Order was established.

The Consent Order established a performance standard of 270 ug/l of TCE in the glacial drift aquifer and 27 ug/l of TCE for the Carimona and Magnolia Members to evaluate the effectiveness of the groundwater containment system to control plume migration and stability.

Data Review

The groundwater containment system currently consists of seven containment wells, including onsite glacial drift wells 109 and 110, downgradient glacial drift wells 111, 112 and 113, and onsite Magnolia Member wells MG1 and MG2 (Figure 2)

Groundwater containment has been ongoing since December 1985. The 2003 AMR indicates that 309 million gallons of water were pumped from the containment wells in 2003. Approximately 68 million gallons of water were pumped from the onsite glacial drift wells, 139 million gallons from the downgradient glacial drift wells, and 102 million gallons from the Magnolia Member wells.

The onsite glacial drift containment system was designed to contain groundwater in the glacial drift with the highest TCE concentrations. The average combined pumping rate for onsite glacial drift wells 109 and 110 was 129 gallons per minute (gpm) during 2003.

The downgradient glacial drift containment system was designed to contain groundwater in the glacial drift downgradient of the site with a TCE concentration exceeding 270 ug/l. The average combined pumping rate for downgradient glacial drift wells 111, 112 and 113 was 266 gpm during 2003.

Carimona Member containment well 108 had not been operated since 1993 when the Magnolia Member containment wells MG1 and MG2 began operation. Well 108 was abandoned in 2003.

The Magnolia Member containment system consists of containment wells MG1 and MG2 and is designed to contain groundwater with a TCE concentration exceeding 27 ug/l in the Carimona and the Magnolia Members of the Platteville Formation. Wells MG1 and MG2 pumped at an average combined rate of 195 gpm in 2003.

Groundwater pumped from the onsite glacial drift wells contains the highest TCE concentrations and is pumped to an onsite air stripping tower prior to discharge to the storm sewer. The water from the remaining containment wells is discharged directly to the storm sewer. The storm sewer eventually discharges the water to the Mississippi River per the requirements of an NPDES permit issued by the MPCA. The NPDES discharge limits include an annual average effluent TCE concentration of 50 ug/l with a daily maximum of 100 ug/l. Laboratory analysis indicates the quarterly samples collected in 2003 were in compliance with the permit.

A complete media change-out of the air stripper was performed during May 2003. The spent material was shipped to the SKB Rosemount industrial waste facility for disposal. Scale formation within the air stripping tower has been identified as a cause of decreased treatment efficiency in the past. In 2000, General Mills installed a pretreatment system in an effort to reduce the hardness and scale buildup. An additional upgrade to the pretreatment system was installed in February 2002. An evaluation of the effectiveness of the pretreatment system is ongoing.

The groundwater elevations indicate the horizontal groundwater flow direction is to the southwest in the glacial drift aquifer. The groundwater flow direction in the bedrock is

generally to the northwest in the Carimona Member, to the southeast in the Magnolia Member and to the southwest in the St. Peter Sandstone.

The 2003 annual monitoring program included the collection and analysis of groundwater samples from monitoring wells screened in the glacial drift aquifer, wells open to the Carimona and Magnolia Members of the Platteville Formation, wells screened in the St. Peter Sandstone, and one well open to the Prairie du Chien/Jordan (former Henkel well). The 2000-2005 Operations and Monitoring Plan requires that groundwater samples collected during even years be analyzed for TCE and during odd years for a longer list of VOCs. The annual groundwater sampling at the monitoring wells was performed during October 28-31, 2003. The general findings for the 2003 sampling data and the historical data are as follows:

- Five glacial drift wells (Q, T, V, W and X) were sampled in 2003. Laboratory analysis detected several VOCs, including 14 ug/l of TCE at well V and W (Table 1). The TCE concentration at the five wells was below the performance standard which is 270 ug/l for the glacial drift aquifer. A review of the historical data indicates the TCE concentrations in the glacial drift monitoring wells have been decreasing as indicated on Figure 3.
- Six monitoring wells (9, 10, 11, 12, SS and UU) screened in the Carimona Member of the Platteville Formation were sampled. Laboratory analysis detected several VOCs, including a TCE concentration which ranged from 1.1 ug/l at well 9 to 48 ug/l at well 11 (Table 2). The TCE concentration at well 11 exceeds the performance standard which is 27 ug/l for the Carimona member. The TCE concentration at the five remaining wells was below the performance standard. A review of the historical data indicates the TCE concentrations in the Carimona Member monitoring wells have decreased compared to the historical concentrations and have been stable in recent years as indicated on Figure 4.
- Three monitoring wells (14, QQ and TT) open to the Magnolia Member of the Platteville Formation were sampled. Laboratory analysis detected several VOCs, including 5.6 ug/l of TCE at well TT (Table 3). The TCE concentration at the three wells was below the performance standard which is 27 ug/l for the Magnolia member. The historical data indicates the TCE concentration in the Magnolia Member monitoring wells have been below the performance standard since about 1993 (Figure 5).
- Three monitoring wells (200, 202 and 203) completed in the St. Peter Sandstone were sampled. Laboratory analysis detected two VOCs, including 28 ug/l of TCE at well 203 (Table 4). Well 200 is the closest St. Peter Sandstone monitoring well to the Site and this well has historically had the highest TCE concentrations. The TCE concentration detected at well 200 has historically been decreasing (Figure 6) and was 4.2 ug/l in the October 2003 sample. Well 2003 is the furthest St. Peter Sandstone well from the Site. Well 203 had the highest TCE concentration in the October 2003

sample. The TCE concentration in well 203 has been increasing and may be indicative of a source area unrelated to the Site.

- A groundwater sample was collected from the former Henkel well which is completed in the Prairie du Chien/Jordan formation. Laboratory analysis detected two VOCs, including 4.0 ug/l of TCE (Table 5).

A combination of composite and grab samples were collected quarterly from the containment wells for analysis pursuant to the 2000-2005 Operations and Monitoring Plan. The general findings for the 2003 data and the historical data are as follows:

- The average TCE influent concentration was approximately 218 ug/l from the onsite glacial drift containment wells (109 and 110). The highest TCE influent concentration was detected at well 110, including 350 ug/l in the duplicate sample collected during March 2003 (Table 6). The TCE concentration in the onsite glacial drift containment wells has decreased from about 1,000 ug/l in the 1980's to an average of about 220 ug/l in 2002 and 2003.
- The average TCE influent concentration was approximately 48 ug/l from the downgradient glacial drift containment wells (111, 112 and 113). The highest TCE influent concentration was detected at well 113, including 110 ug/l in the sample collected during March 2003 (Table 7). The TCE concentration in the downgradient glacial drift containment wells has decreased from about 300 ug/l in the 1980's to an average of about 50 ug/l in 2003.
- The average TCE influent concentration was approximately 12 ug/l from the Magnolia Member wells (MG1 and MG2). The highest TCE influent concentration was detected at well MG1, including 19 ug/l in the sample collected during March 2003 (Table 8). The TCE concentration in the Magnolia Member containment wells has decreased from about 25 ug/l in the 1980's to an average of 12 ug/l in 2003.

A 24-hour recovery test was performed using the Magnolia Member wells during October 2003. The purpose of the test was to determine if the Magnolia containment wells are maintaining an adequate capture zone in the Platteville Formation. The 2003 AMR states that "the pumping rates, the recovery test data, and the water quality data show that pump-out wells MG1 And MG2 continue to effectively capture Platteville Formation groundwater and control the extent of the TCE concentration specified in the Consent Order." The 2003 AMR prepared by Barr Engineering is currently under review by MPCA staff.

General Mills performed additional soil sampling at and around the former absorption pit in May 2001. Nine soil borings were advanced with soil samples collected for laboratory analysis. Several VOCs were detected in the soil samples, primarily below a depth of 4 feet. The MPCA stated in a September 28, 2001 letter "that no further action is needed to remediate soils at this point in time...". However, the MPCA stated that "this position

applies only as long as General Mills and the current landowner execute an institutional control in the form of a restrictive covenant for the shallow soils area...”

Site Visit

Site visits have been conducted periodically throughout the review period; however, a site visit was conducted on June 3, 2004 as part of the Five-Year Review process. The monitoring wells and recovery wells referenced in this document are in place and operational.

Interviews

Mr. Larry Deeney, Manager of Environmental Protection for General Mills was interviewed on June 23, 2004. Mr. Deeney stated the remedy is in an operation and monitoring mode and is performing as intended. He also stated a desire to proceed towards delisting of the site.

VII. TECHNICAL ASSESSMENT

Question A: Is the remedy functioning as intended by the decision documents?

The October 23, 1984 Consent Order documented the remedial action for the General Mills/Henkel Corporation Site. The remedial action included the construction and operation of a groundwater containment system and establishment of a long-term groundwater monitoring network.

The Consent Order states in Section 1.0 of the RAP that “The purpose of this Remedial Action Plan.... is to define and implement the procedures necessary for minimizing the further migration of volatile organic hydrocarbons and in particular trichloroethylene (TCE) detected near the General Mills absorption pit in the ground water in the glacial drift and the Platteville Formation, and to improve the quality of the ground water in the glacial drift and Platteville Formation in the area of the General Mills absorption pit.” This clearly establishes the objective of the remedial action as a containment system, not an aquifer restoration.

The groundwater containment remedy continues to remove VOCs from the aquifers and has resulted in stable to decreasing contaminant concentrations since the remedy was implemented. The contaminant plume is not migrating and is decreasing in lateral and vertical extent. There are no known drinking water wells which are currently impacted by the contaminant plume.

The system has been in operation for 19 years. There do not appear to be operation and maintenance issues that have adversely affected the groundwater extraction and treatment system.

The MPCA is currently working with BBD Holdings to establish institutional controls in the form of a restrictive covenant for both soil and groundwater contamination which remains on site. Once the institutional controls are finalized, the operational and administrative tasks will be complete to ensure the effectiveness of the remedial action.

Once the institutional controls are in place, the MPCA will proceed with deletion of the site from the Minnesota Permanent List of Priorities (PLP). The MPCA has also requested that EPA evaluate the site for deletion from the NPL based on the criteria that the response actions have been implemented and the remedy is a groundwater containment system with long-term operation and monitoring.

Question B: Are the exposure assumptions, toxicity data, cleanup levels, and remedial action objectives (RAOs) used at the time of the remedy selection still valid?

The exposure assumptions are valid but other factors have been revised or have changed through the evolution of the remedy. Due to the lack of human or environmental receptors in the aerial extent of the plume, the remedial action objectives of the Consent Order are being amended to eliminate the restoration component of the remedy. Once implemented, cleanup levels will no longer be necessary. Performance standards will be included in the Consent Order amendment to establish criteria by which the remedial action can proceed to Site closure.

Question C: Has any other information come to light that could question the protectiveness of the remedy?

There is no other information that calls into question the protectiveness of the remedy.

VIII. ISSUES

Issue	Currently Affects Protectiveness (Y/N)	Affects Future Protectiveness (Y/N)
The institutional controls are not in place.	N	Y
Performance standards must be revised.	N	N

IX. RECOMMENDATIONS

The groundwater containment remedy is removing VOCs from the aquifers and has resulted in a stable to decreasing contaminant plume. It is recommended that the groundwater remedy continue as appropriate based on the findings of the annual review.

The site is being evaluated for delisting from the PLP and the NPL based on implementation of the institutional controls and continued success of the groundwater containment system. The following recommendations are:

- Finalize the institutional controls which will consist of a restrictive covenant. The current property owner has submitted a draft restrictive covenant for MPCA review and will record the final document with Hennepin County once it is approved by MPCA. The restrictive covenant is expected to be in place by June 2005.
- Continue to operate, maintain and monitor the groundwater containment system to the extent necessary to maintain protectiveness of human health and the environment. The effectiveness of the groundwater containment system should continue to be evaluated on an annual basis in the AMR with the intent of revising the system as needed.
- Amend the current consent order to establish new performance standards and to clarify the objective of the remedy as plume containment. This amendment is expected to be finalized by December 2004.
- Recommend to EPA that the Site be deleted from the NPL once the Consent Order is amended and institutional controls are put in place.

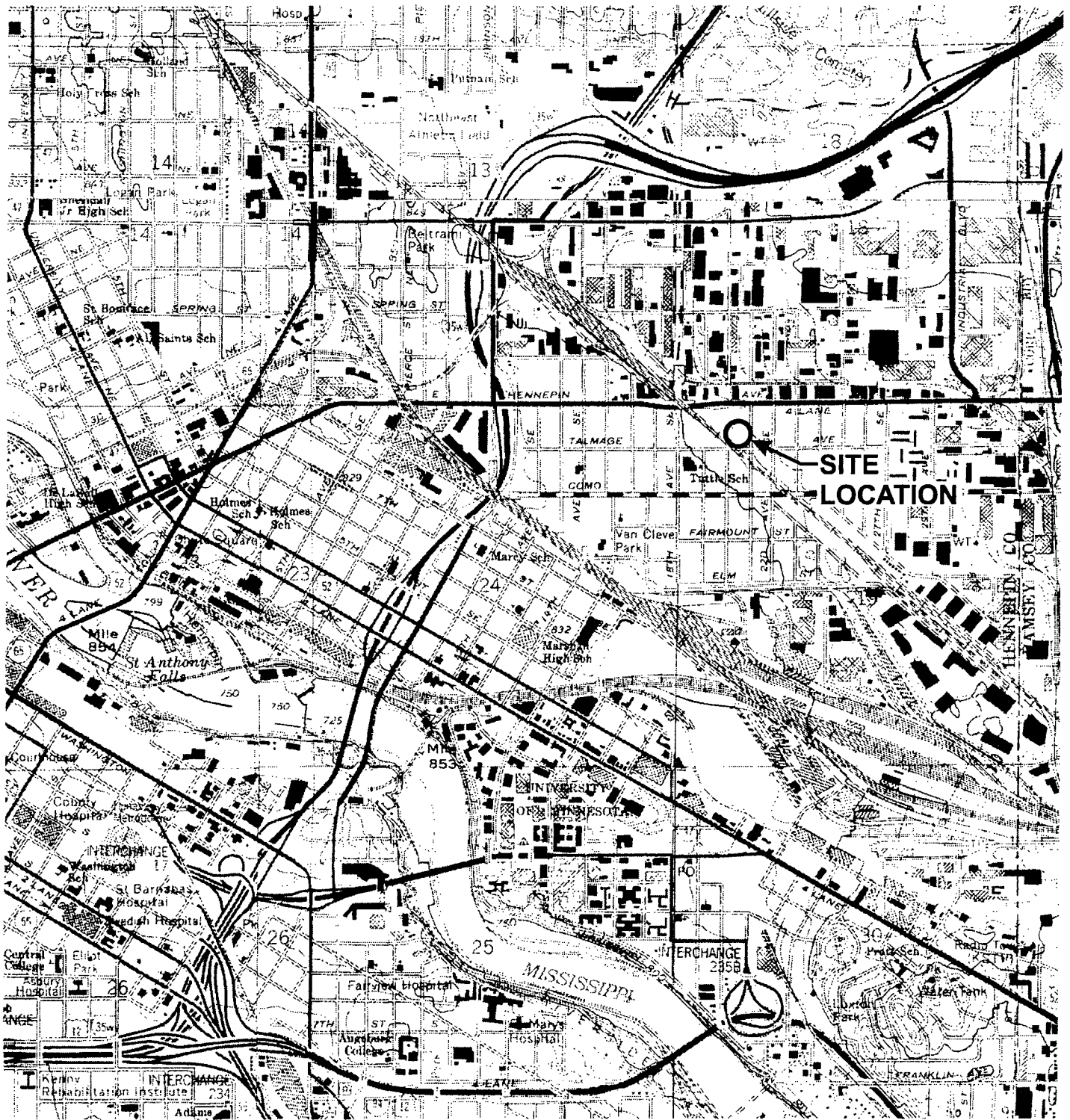
X. PROTECTIVENESS STATEMENT

The groundwater containment remedy is controlling plume migration both laterally and vertically. The remedy is functioning as intended and is protective of human health and the environment in the short term. Long term protectiveness will be ensured once the amended performance standards have been implemented and the institutional controls are in place.

XI. NEXT REVIEW

Hazardous substances, pollutants, or contaminants will remain at the General Mills Site that will not allow for unlimited use or unrestricted exposure. EPA or the MPCA, if delegated to do so by EPA, will conduct another Five-Year Review five years from the date of this review in September 2009.

APPENDIX A



Source: Minneapolis North, New Brighton, Minneapolis South and St. Paul West, Minnesota Quadrangles, 7.5 Minute Series, 1993.



0 2000 4000

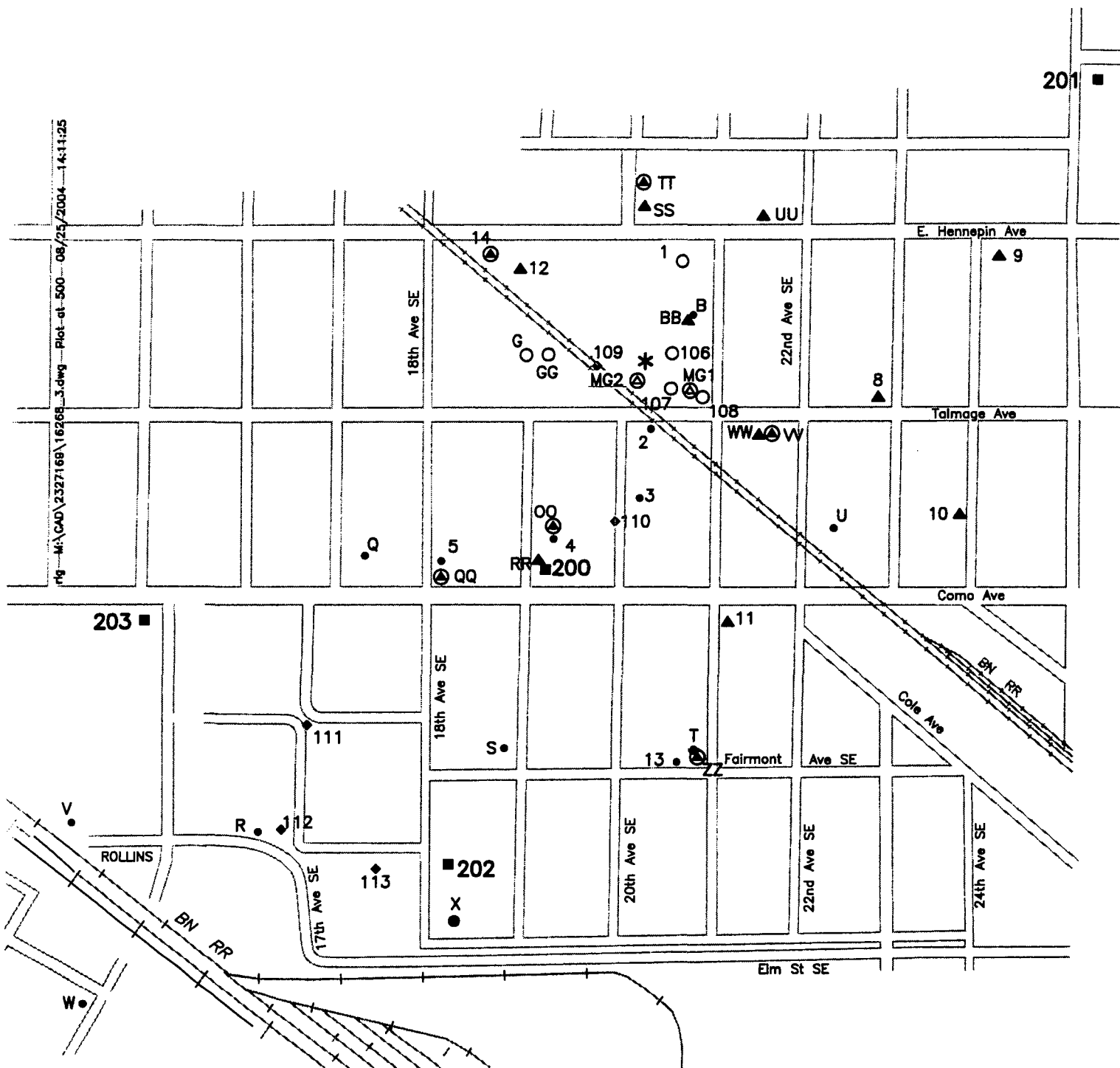
Scale in Feet



QUADRANGLE LOCATION

Figure 1

EAST HENNEPIN AVENUE SITE
REGIONAL LOCATION MAP



- GLACIAL DRIFT MONITORING WELL
- ◆ SITE AND DOWNGRAIDENT GLACIAL DRIFT PUMP-OUT WELL
- ST. PETER SANDSTONE MONITORING WELL
- * FORMER DISPOSAL SITE
- ▲ CARIMONA MEMBER MONITORING WELL
- ⬆ MAGNOLIA MEMBER MONITORING WELL
- ⬆ MAGNOLIA MEMBER PUMP-OUT WELL
- WELL ABANDONED 2003

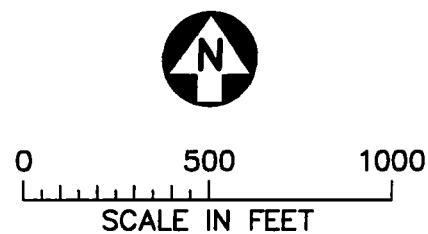


Figure 2
SITE MONITORING WELL LOCATIONS

Figure 3
Glacial Drift Wells
TCE Concentrations
1985-2003

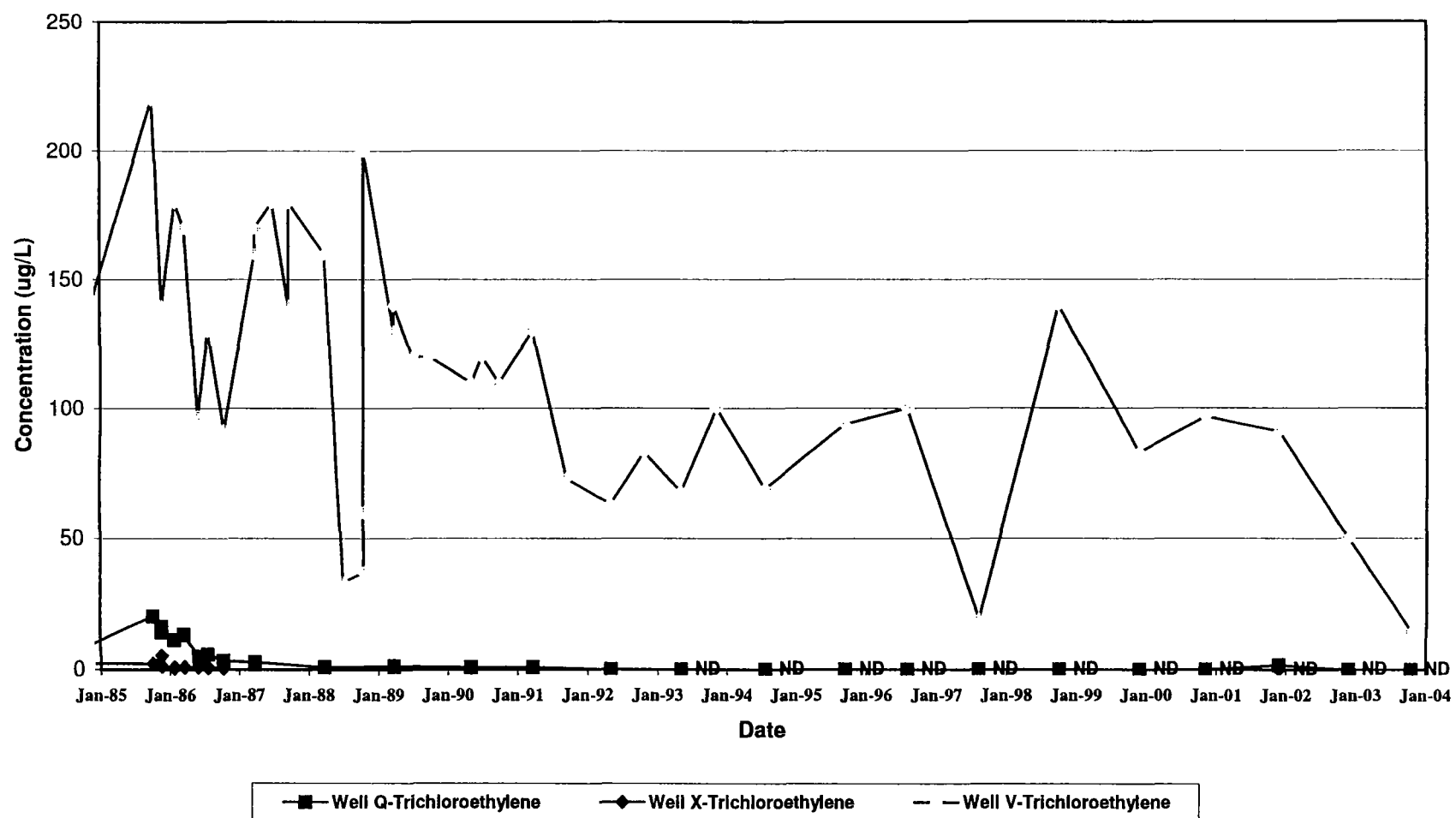


Figure 4
Carimona Member Wells
TCE Concentrations
1985-2003

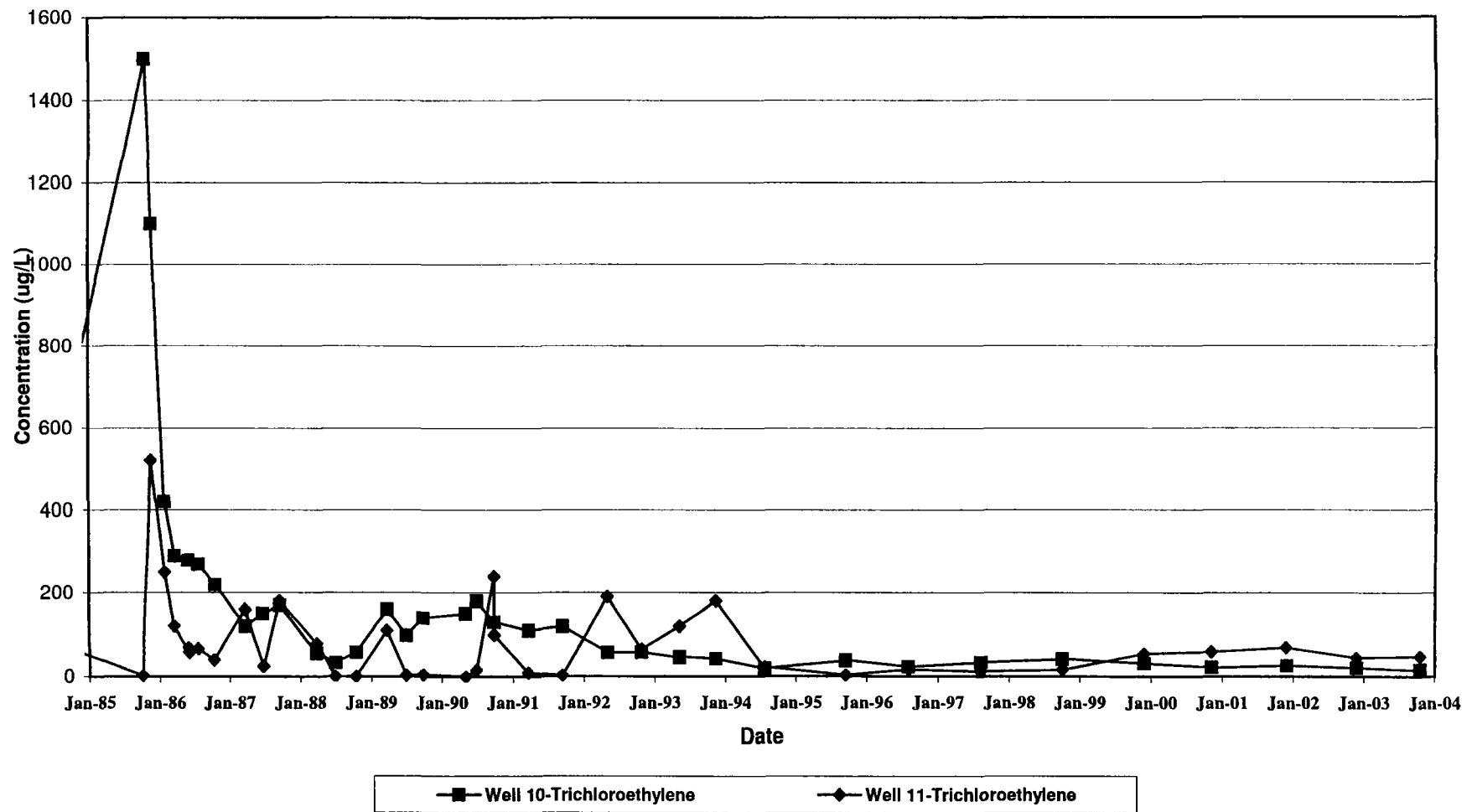


Figure 5
Magnolia Member Wells
TCE Concentrations
1985-2003

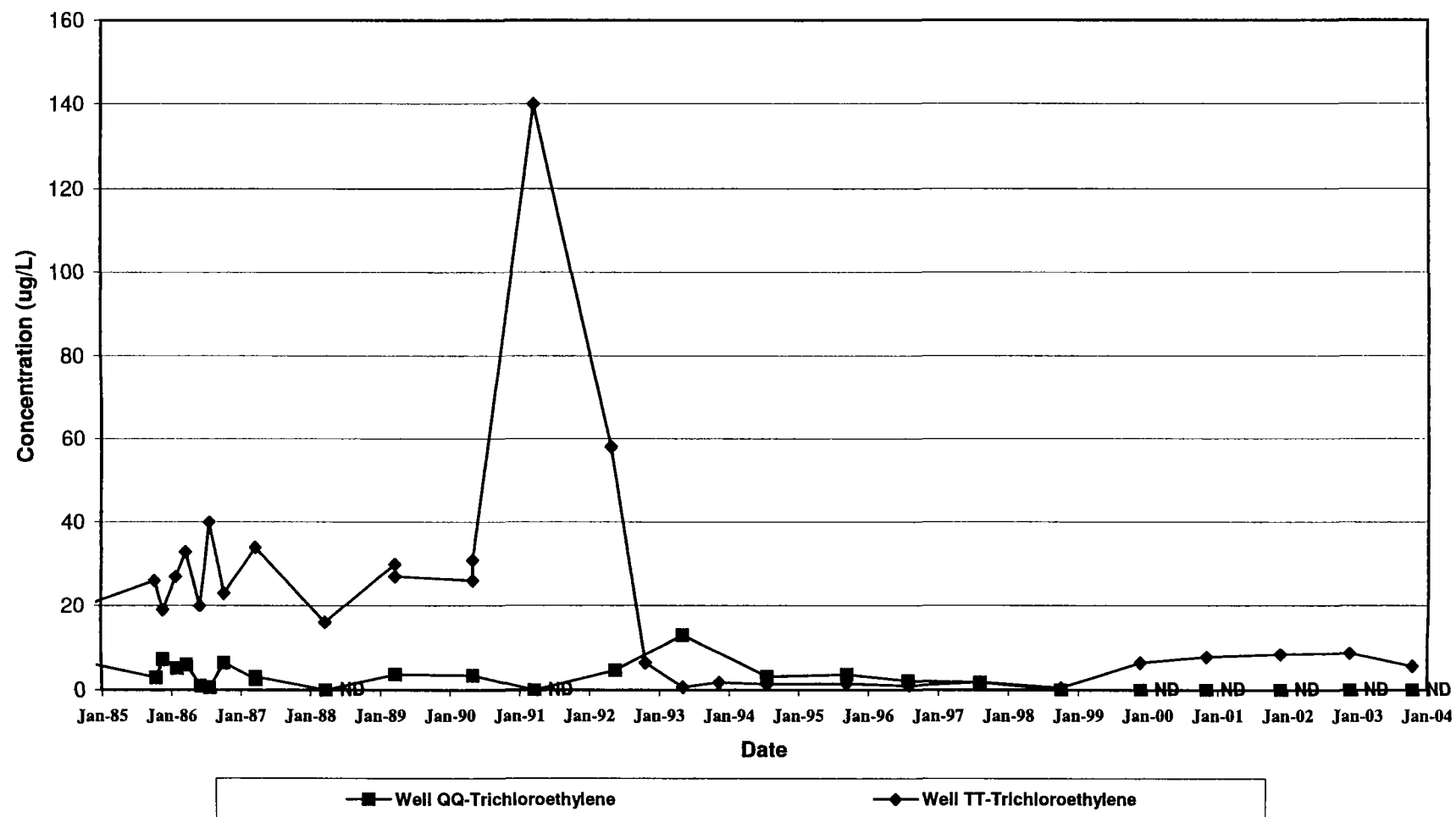
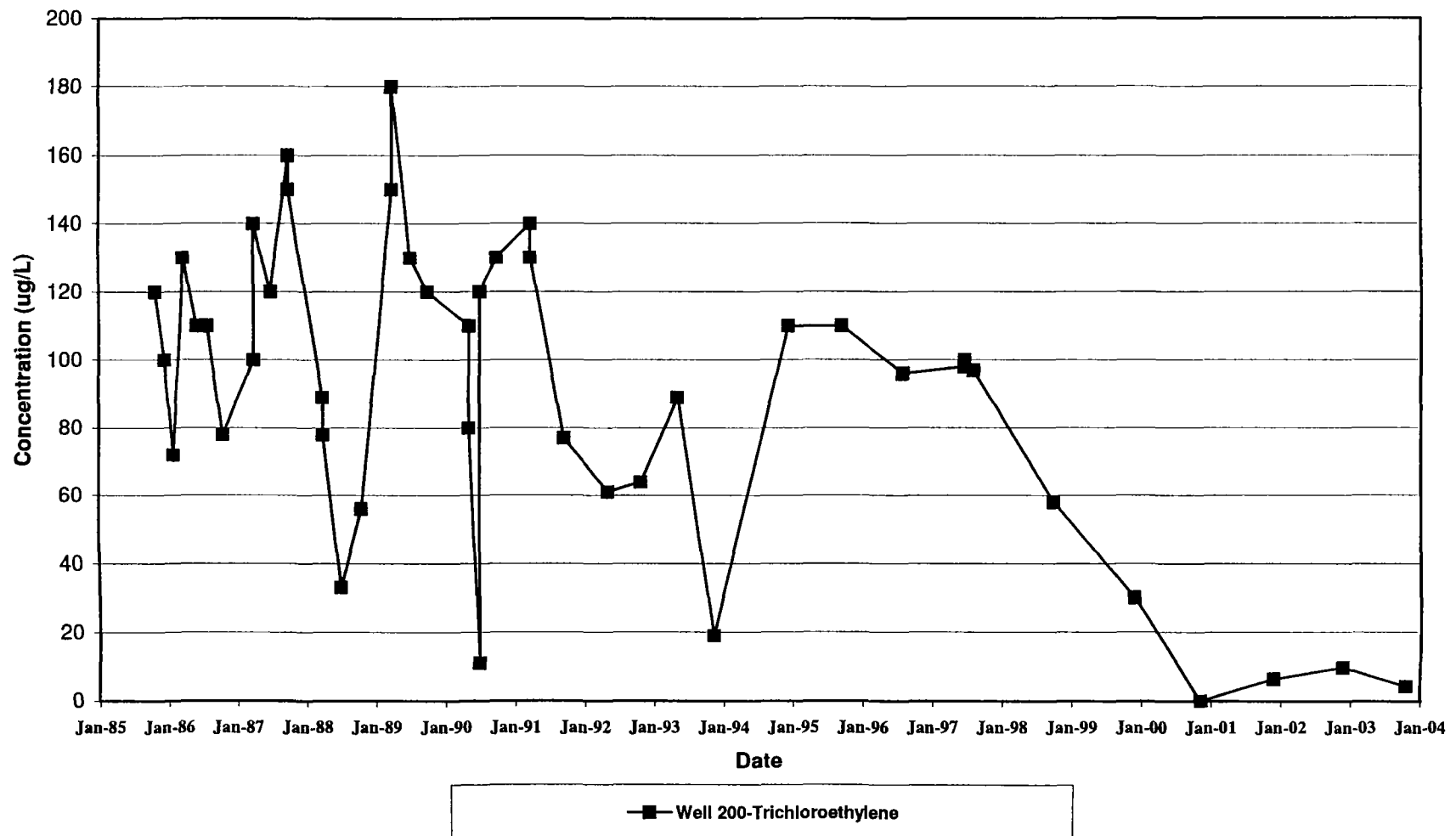


Figure 6
St. Peter Sandstone Wells
TCE Concentrations
1985-2003



APPENDIX B

Table 1
2004 Five Year Review Water Quality Data
Glacial Drift Wells

(concentrations in ug/L)

Location Date	Q 10/29/2003	T 10/29/2003	V 10/29/2003	W 10/29/2003	X 10/29/2003	Consent Order Limit
1,1,1-Trichloroethane	2.4	<1.0	<1.0	<2.0	<1.0	--
1,1,2,2-Tetrachloroethane	<1.0	<1.0	<1.0	<2.0	<1.0	--
1,1-Dichloroethane	<1.0	<1.0	<1.0	<2.0	<1.0	--
1,2-Dichloroethane	<1.0	<1.0	<1.0	<2.0	<1.0	--
1,2-Dichloroethylene, cis	<1.0	<1.0	<1.0	52	<1.0	--
1,2-Dichloroethylene, trans	<1.0	<1.0	<1.0	3.5	<1.0	--
Benzene	<1.0	<1.0	<1.0	<2.0	<1.0	--
Ethyl benzene	<1.0	<1.0	<1.0	<2.0	<1.0	--
Tetrachloroethylene	<1.0	<1.0	<1.0	<2.0	<1.0	--
Toluene	<1.0	<1.0	<1.0	<2.0	<1.0	--
Trichloroethylene	<1.0	<1.0	14	14	<1.0	270
Vinyl chloride	<1.0	<1.0	<1.0	<2.0	<1.0	--
Xylenes total	<3.0	<3.0	<3.0	<6.0	<3.0	--

-- No consent order limit.

Table 2
2004 Five Year Review Water Quality Data
Carimona Member Wells

(concentrations in ug/L)

Location Date Dup	SS 10/28/2003	UU 10/29/2003	9 10/30/2003	10 10/30/2003	10 10/30/2003 DUP	11 10/28/2003	12 10/28/2003	Consent Order Limit
1,1,1-Trichloroethane	<1.0	1.5	<1.0	1.2	1.2	<2.0	<1.0	--
1,1,2,2-Tetrachloroethane	<1.0	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	--
1,1-Dichloroethane	3.0	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	--
1,2-Dichloroethane	<1.0	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	--
1,2-Dichloroethylene, cis	<1.0	<1.0	<1.0	<1.0	<1.0	7.5	<1.0	--
1,2-Dichloroethylene, trans	<1.0	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	--
Benzene	<1.0	<1.0	12	<1.0	<1.0	6.9	<1.0	--
Ethyl benzene	<1.0	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	--
Tetrachloroethylene	<1.0	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	--
Toluene	<1.0	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	--
Trichloroethylene	2.9	25	1.1	15	16	48	1.7	27
Vinyl chloride	<1.0	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	--
Xylenes total	<3.0	<3.0	<3.0	<3.0	<3.0	<6.0	<3.0	--

-- No consent order limit.

Table 3
2004 Five Year Review Water Quality Data
Magnolia Member Wells

(concentrations in ug/L)

Location Date	QQ 10/29/2003	TT 10/28/2003	14 10/28/2003	Consent Order Limit
1,1,1-Trichloroethane	<1.0	2.0	1.6	--
1,1,2,2-Tetrachloroethane	<1.0	<1.0	<1.0	--
1,1-Dichloroethane	<1.0	<1.0	<1.0	--
1,2-Dichloroethane	<1.0	<1.0	<1.0	--
1,2-Dichloroethylene, cis	1.1	2.9	1.7	--
1,2-Dichloroethylene, trans	<1.0	<1.0	<1.0	--
Benzene	<1.0	<1.0	<1.0	--
Ethyl benzene	<1.0	<1.0	<1.0	--
Tetrachloroethylene	<1.0	<1.0	<1.0	--
Toluene	<1.0	<1.0	<1.0	--
Trichloroethylene	<1.0	5.6	4.7	27
Vinyl chloride	<1.0	<1.0	<1.0	--
Xylenes total	<3.0	<3.0	<3.0	--

-- No consent order limit.

Table 4
2004 Five Year Review Water Quality Data
St. Peter Sandstone Wells

(concentrations in ug/L)

Location Date	200 10/31/2003	202 10/30/2003	203 10/31/2003	Consent Order Limit
1,1,1-Trichloroethane	<1.0	<1.0	<1.0	--
1,1,2,2-Tetrachloroethane	<1.0	<1.0	<1.0	--
1,1-Dichloroethane	<1.0	<1.0	<1.0	--
1,2-Dichloroethane	<1.0	<1.0	<1.0	--
1,2-Dichloroethylene, cis	1.6	<1.0	3.6	--
1,2-Dichloroethylene, trans	<1.0	<1.0	<1.0	--
Benzene	<1.0	<1.0	<1.0	--
Ethyl benzene	<1.0	<1.0	<1.0	--
Tetrachloroethylene	<1.0	<1.0	<1.0	--
Toluene	<1.0	<1.0	<1.0	--
Trichloroethylene	4.2	<1.0	28	27
Vinyl chloride	<1.0	<1.0	<1.0	--
Xylenes total	<3.0	<3.0	<3.0	--

-- No consent order limit.

Table 5
2004 Five Year Review Water Quality Data
Prairie Du Chien / Jordan Well

(concentrations in ug/L)

Location Date	HENKEL 10/31/2003
1,1,1-Trichloroethane	<1.0
1,1,2,2-Tetrachloroethane	<1.0
1,1-Dichloroethane	<1.0
1,2-Dichloroethane	<1.0
1,2-Dichloroethylene, cis	4.2
1,2-Dichloroethylene, trans	<1.0
Benzene	<1.0
Ethyl benzene	<1.0
Tetrachloroethylene	<1.0
Toluene	<1.0
Trichloroethylene	4.0
Vinyl chloride	<1.0
Xylenes total	<3.0

Table 6
2004 Five Year Review Water Quality Data
Site Glacial Drift Pump-Out and Treatment Systems

(concentrations in ug/L)

Location Date Dup	109 3/13/2003	110 3/13/2003	110 3/13/2003 DUP	Flow Weighted Site Glacial Drift Influent Average 3/13/2003	INF 6/2/2003	109 8/26/2003	110 8/26/2003	Flow Weighted Site Glacial Drift Influent Average 8/26/2003	INF 10/31/2003	EFF ** 3/13/2003	EFF ** 6/2/2003	EFF ** 8/26/2003	EFF ** 10/31/2003
1,1,1-Trichloroethane	<5.0	<10	<10	NC	<10	<5.0	<10	NC	<10	<1.0	<1.0	<1.0	<1.0
1,1,2,2-Tetrachloroethane	<5.0	<10	<10	NC	<10	<5.0	<10	NC	<10	<1.0	<1.0	<1.0	<1.0
1,1-Dichloroethane	<5.0	<10	<10	NC	<10	<5.0	<10	NC	<10	<1.0	<1.0	<1.0	<1.0
1,2-Dichloroethane	<5.0	<10	<10	NC	<10	<5.0	<10	NC	<10	<1.0	<1.0	<1.0	<1.0
1,2-Dichloroethylene, cis	5.0	73	67	NC	40	<5.0	54	NC	24	<1.0	<1.0	<1.0	<1.0
1,2-Dichloroethylene, trans	<5.0	<10	<10	NC	<10	<5.0	<10	NC	<10	<1.0	<1.0	<1.0	<1.0
Benzene	<5.0	<10	<10	NC	<10	<5.0	<10	NC	<10	<1.0	<1.0	<1.0	<1.0
Ethyl benzene	<5.0	<10	<10	NC	<10	<5.0	<10	NC	<10	<1.0	<1.0	<1.0	<1.0
Tetrachloroethylene	<5.0	<10	<10	NC	<10	<5.0	<10	NC	<10	<1.0	<1.0	<1.0	<1.0
Toluene	<5.0	<10	<10	NC	<10	<5.0	<10	NC	<10	<1.0	<1.0	<1.0	<1.0
Trichloroethylene	150	340	350	262	220	110	300	188	200	<1.0	<1.0	<1.0	<1.0
Vinyl chloride	<5.0	<10	<10	NC	<10	<5.0	<10	NC	<10	<1.0	<1.0	<1.0	<1.0
Xylenes total	<15	<30	<30	NC	<30	<15	<30	NC	<30	<3.0	<3.0	<3.0	<3.0
Sum Volatile Organics	155	413	417	305	260	110	354	211	224	ND	ND	ND	ND

ND Not detected.

NC Flow weighted average not calculated for these individual contaminants.

** Effluent limit for TCE - 50 ug/L average and 100 ug/L instantaneous

Table 7
2004 Five Year Review Water Quality Data
Downgradient Glacial Drift Pump-Out System

(concentrations in ug/L)

Location Date Dup	111 3/13/2003	112 3/13/2003	113 3/13/2003	Flow Weighted Discharge 3/13/2003	Discharge 6/2/2003	Flow Weighted Discharge 6/2/2003	111 8/26/2003	112 8/26/2003	113 8/26/2003	113 8/26/2003 DUP	Flow Weighted Discharge 8/26/2003	Discharge 10/31/2003	Flow Weighted Discharge 10/31/2003
1,1,1-Trichloroethane	3.2	1.7	<5.0	NC	2.8	NC	1.8	<1.0	<5.0	<10	NC	<2.0	NC
1,1,2,2-Tetrachloroethane	<1.0	<1.0	<5.0	NC	<2.0	NC	<1.0	<1.0	<5.0	<10	NC	<2.0	NC
1,1-Dichloroethane	<1.0	<1.0	<5.0	NC	<2.0	NC	<1.0	<1.0	<5.0	<10	NC	<2.0	NC
1,2-Dichloroethane	<1.0	<1.0	<5.0	NC	<2.0	NC	<1.0	<1.0	<5.0	<10	NC	<2.0	NC
1,2-Dichloroethylene, cis	<1.0	2.8	18	NC	7.2	NC	<1.0	2.7	19	20	NC	6.3	NC
1,2-Dichloroethylene, trans	<1.0	<1.0	<5.0	NC	<2.0	NC	<1.0	<1.0	<5.0	<10	NC	<2.0	NC
Benzene	<1.0	<1.0	<5.0	NC	<2.0	NC	<1.0	<1.0	<5.0	<10	NC	<2.0	NC
Ethyl benzene	<1.0	<1.0	<5.0	NC	<2.0	NC	<1.0	<1.0	<5.0	<10	NC	<2.0	NC
Tetrachloroethylene	<1.0	2.2	<5.0	NC	<2.0	NC	<1.0	1.4	<5.0	<10	NC	<2.0	NC
Toluene	<1.0	<1.0	<5.0	NC	<2.0	NC	<1.0	<1.0	<5.0	<10	NC	<2.0	NC
Trichloroethylene	2.9	52	110	47	44	44	1.7	40	90	100	55	48	48
Vinyl chloride	<1.0	<1.0	<5.0	NC	<2.0	NC	<1.0	<1.0	<5.0	<10	NC	<2.0	NC
Xylenes total	<3.0	<3.0	<15	NC	<6.0	NC	<3.0	<3.0	<15	<30	NC	<6.0	NC
Sum Volatile Organics	6.1	59	128	55	54	54	3.5	44	109	120	65	54	54

-- Not analyzed.

NC Flow weighted average not calculated for these individual contaminants.

Table 8
2004 Five Year Review Water Quality Data
Magnolia Pump-Out System

(concentrations in ug/L)

Location Date Dup	MG1 3/13/2003	MG2 3/13/2003	Flow Weighted MG Discharge Average 3/13/2003	MGEFF 6/2/2003	MGEFF 6/2/2003 DUP	Flow Weighted MG Discharge Average 6/2/2003	MG1 8/26/2003	MG2 8/26/2003	Flow Weighted MG Discharge Average 8/26/2003	MGEFF 10/31/2003
1,1,1-Trichloroethane	<1.0	<1.0	NC	<1.0	<1.0	NC	<1.0	<1.0		<1.0
1,1,2,2-Tetrachloroethane	<1.0	<1.0	NC	<1.0	<1.0	NC	<1.0	<1.0	NC	<1.0
1,1-Dichloroethane	<1.0	<1.0	NC	<1.0	<1.0	NC	<1.0	<1.0	NC	<1.0
1,2-Dichloroethane	<1.0	<1.0	NC	<1.0	<1.0	NC	<1.0	<1.0	NC	<1.0
1,2-Dichloroethylene, cis	3.3	1.6	NC	2.5	1.7	NC	2.9	1.8	NC	2.1
1,2-Dichloroethylene, trans	<1.0	<1.0	NC	<1.0	<1.0	NC	<1.0	<1.0	NC	<1.0
Benzene	1.3	<1.0	NC	1.0	1.0	NC	1.7	<1.0	NC	<1.0
Ethyl benzene	<1.0	<1.0	NC	<1.0	<1.0	NC	<1.0	<1.0	NC	<1.0
Tetrachloroethylene	<1.0	<1.0	NC	<1.0	<1.0	NC	<1.0	<1.0	NC	<1.0
Toluene	<1.0	<1.0	NC	<1.0	<1.0	NC	2.7 b	<1.0	NC	<1.0
Trichloroethylene	19	9.6	14.4	12	12	12	15	8.0	10.9	12
Vinyl chloride	<1.0	<1.0	NC	<1.0	<1.0	NC	<1.0	<1.0	NC	<1.0
Xylenes total	<3.0	<3.0	NC	<3.0	<3.0	NC	<3.0	<3.0	NC	<3.0
Sum Volatile Organics	23.6	11.2	17.6	15.5	14.7	15.1	22.3	9.8	15.0	14.1

ND Not detected.

NC Flow weighted average not calculated for these individual contaminants.

b Potential false positive value based on blank data validation procedures.

APPENDIX C

BIBLIOGRAPHY

June 1983 Site Characterization Study and Remedial Action Plan, General Mills Solvent Disposal Site, Barr Engineering Company

October 23, 1984 Response Order by Consent between General Mills, Inc. and the Minnesota Pollution Control Agency

September 1994 Five-Year Review

February 14, 1997 letter from Barr Engineering Company transmitting the receptor survey

February 1999, 1998 Annual Report, East Hennepin Avenue Site, Barr Engineering Company

September 1999 Five-Year Review

February 2000, 1999 Annual Report, East Hennepin Avenue Site, Barr Engineering Company

September 27, 2000, Work Plan Soil Investigation Around Former Chlorinated Solvent Disposal Area, East Hennepin Avenue Site, Barr Engineering Company

February 2001, 2000 Annual Report, East Hennepin Avenue Site, Barr Engineering Company

May 10, 2001 letter from MPCA with comments regarding the 2000 Annual Monitoring Report

August 30, 2001 Shallow Soil Investigation Around the Former Disposal Site, East Hennepin Avenue Site, Barr Engineering

March 2002, 2001 Annual Report, East Hennepin Avenue Site, Barr Engineering Company

February 2004, 2003 Annual Report, East Hennepin Avenue Site, Barr Engineering Company